

Forum: Economic and Social Council (ECOSOC)

Issue: Assessing the socioeconomic impact of e-Health services on national health system

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INTRODUCTION¹

E-Health services constitute a variety of healthcare practices and tools supported by the use of telecommunications and digital technologies aiming at the facilitation of health improvement and the dissemination of information and services to patients across the globe. Specifically, these practices use Information and Communication Technologies (ICTs) and are designed to enhance disease management, to strengthen health systems, to improve health surveillance and to provide healthcare especially in remote or low- and middle-income countries (LIMCs) worldwide.



Figure 1: ICTs in e-Health services

One of the main systems of e-Health services is the Electronic Health Record (EHR). The EHR is a software that collects health data, such as a patient's medical history and prescriptions and is used to track and share this information through various information networks and to support the efficiency and quality of healthcare delivery.

Although the idea and concept of e-Health care dates back to the 20th century, the official recognition and establishment of an e-Health strategy by the World Health Organization (WHO) took place in the year 2005. Alongside with this event, the WHO also launched the Global Observatory for e-Health (GOe). The GOe is the first global survey on e-Health and its mission is to improve health and to meticulously study the evolution and implications of e-Health strategies on a global scale.

1 Figure 1: <https://ehealthnews.co.za/wp-content/uploads/2018/09/eHealth-eHealthNews-470x272.jpg>

The use of the aforementioned e-Health strategies has a huge impact on the global community in regards to financial and social aspects. E-Health systems can address population needs and provide medical care in remote environments and countries that are less economically developed. Additionally, the WHO has acknowledged that e-Health is "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research"² thus proving that e-Health systems can seriously contribute in the improvement of healthcare. However, the implementation of e-Health practices can also have serious repercussions. Namely, some of the possible negative implications of such systems are the implementation, adoption and maintenance costs of practices like the EHR and the risk of privacy and security violations when tracking and sharing personal information of clients.

The assessment of the socioeconomic impacts of e-Health is a burning and ongoing issue, due to the changes in technology and to the constant flow of medical data. Therefore, it is our responsibility to continue monitoring and assessing the impact of the e-Health services implementation on a worldwide scale.

DEFINITION OF KEY-TERMS

E-Health

With the term e-health one refers to the use of information and communication technologies in the delivery of healthcare services.

Electronic Health Record (EHR)

An Electronic Health Record is a digital collection of a patient's health information including prescriptions, medical history, diagnoses, allergies and treatment plans that is accessible to authorized personnel in hospitals or other health centres.

Information and Communication Technologies (ICTs)

The term Information and Communication Technologies is an extensional and broader term for Information Technology (IT) and is used to describe the technology

2 *WHO | World Health Organization, www.who.int/healthacademy/media/WHA58-28-en.pdf.*

needed to integrate telecommunications, software and audiovisual transmission systems and to broadcast media as well as to access, store and share information.

Global Observatory for e-Health (GOe)

The Global Observatory for e-Health is an initiative established in the Fifty-eighth World Health Assembly in 2005, dedicated to the study of the evolution, development and impact of e-Health on countries' health systems.

European Reference Networks (ERNs)

European Reference Networks are virtual networks involving healthcare providers across Europe and aiming at the facilitation of discussion on complex or rare diseases and conditions that require highly specialized treatment, knowledge and resources.³

Artificial Intelligence (AI)

The term Artificial Intelligence refers to the project of developing systems, computers or computer-controlled robots endowed with the intellectual processes, such as the ability to reason, discover meaning, generalize and learn from past experience.⁴

BACKGROUND INFORMATION

Evolution of e-Health⁵

The past few years, countless and crucial technological steps and innovations have been made, affecting people and societies on every level possible, including healthcare. Therefore, the new technological advancements and the world's needs have

3 "Overview." *Public Health - European Commission*, 7 Apr. 2020, ec.europa.eu/health/ern_en.

4 "Artificial Intelligence | Definition, Examples, and Applications." *Encyclopedia Britannica*, www.britannica.com/technology/artificial-intelligence.

5 Figure 2:https://blogs.biomedcentral.com/on-health/wp-content/uploads/sites/8/2019/03/AdobeStock_115660297-e1552318432884.jpg

brought another promising side of healthcare into the spotlight, e-Health. The idea of using information and communication technologies in healthcare arose at the end of the 20th century and had no official definition until the year 2005 when the WHO defined e-Health as "the use of ICTs for health"⁶ and differentiated it from the general idea that e-Health covers anything linked with the use of computers in the field of medicine.

So far, based on a survey conducted in the year 2015 by the WHO, it has been estimated that 70% of the WHO's Member States have an e-Health strategy and that 74% of the countries that have national universal health coverage policy refer to the use of ICTs in healthcare. Additionally, since the risk of privacy violation is one of the main drawbacks regarding the use of e-Health practices and EHRs, 80% of the WHO Member States have legislation to protect the privacy of patients' health data.

Numerous discussions have been made concerning the use of e-Health services worldwide, due to the serious barriers and drawbacks in regards to its implementation. Specifically, more than 20 WHO Member States have claimed that the funding of EHRs and other e-Health practices is the most serious barrier that holds them back from implementing e-Health strategies in their health systems. Additionally, other difficulties are the infrastructure and capacity needed, and the risk of privacy and security violations when it comes to the use of EHRs and other information practices. Therefore, the WHO and the EU have made several proposals and taken various measures to improve the situation, including the introduction of m-Health, a sub-segment of e-Health referring to the support of mobile devices in healthcare but has not yet been defined, and the e-Health Action Plan 2012-2020 focusing on issues of standardization and interoperability.



Figure 2: m-Health

Projects and Initiatives

Global Observatory for e-Health (GOe)

Through the past years, multiple initiatives, programmes and projects have been conducted by the WHO and the EU as well as by Member States individually. One of the first and most important initiatives was the launch of the Global Observatory for e-

6 "EHealth." *World Health Organization*, www.who.int/ehealth/en/.

Health by the WHO. GOe's main goals are to supervise e-Health's evolution and its impact on other countries' national health systems and to provide strategic information and evidence to Member States. This way, GOe has been conducting research and publishing surveys' results, data and reports including the reports "e-Health tools and services: Needs of the Member States", "e-Health and innovation in women's and children's health: a baseline review" and "Global diffusion of e-Health: Making universal health coverage achievable". Other crucial publications of GOe are the "Global Observatory for e-Health series" Volumes one to six, which include country profiles, information on m-Health and Telemedicine as well as legal frameworks and information regarding data management. It is also important to mention that GOe published an Atlas with the title "Atlas of e-Health country profiles 2015: the use of e-Health in support of universal health coverage", presenting data collected from 125 Member States and portraying the use of e-Health services in these countries.

Electronic Health Records (EHRs)

The Electronic Health Records (ERNs) also constitute a highly important initiative concerning e-Health, since they are digital records that obtain a patient's medical information, including their medical history, laboratory test results, personal identification data and billing information. The first EHRs were introduced in the 1960s. Since then, the use and measures regarding EHRs have been constantly changing, as concerns for issues of standardization and interoperability started arising. EHRs acquire transparency, portability and legitimacy in comparison to hand written medical records but the various cyber attacks and data breaches that have taken place in the past have raised concerns regarding the efficiency of their use. This way, a perfected EHR system adhering to certain rules and regulations would definitely facilitate healthcare delivery and would be really beneficial in regards to disease surveillance and research.

European Reference Networks (ERNs)

European Reference Networks are virtual networks used by healthcare professionals across the European Union and they were introduced for the first time in the year 2017. Their main goal is to enable communication and co-operation between healthcare providers and specialists so that they can tackle complex and serious diseases and conditions that require resources and specialised knowledge. As far as legislation is concerned, the EU has discussed and set certain criteria and measures for the use of ERNs in Commission Delegated Decisions like 2014/286/EU⁷ and 2019/129/EU⁸.

7 *Eur-Lex.Europa.Eu*, 2020, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0286&from=EN>.

8 *Eur-Lex.Europa.Eu*, 2020, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0129&from=EN>.

Benefits of e-Health

The implementation of e-Health practices can have a great impact on a country's national health system on many levels. Firstly, digital innovations, like telecommunications or the use of ICTs generally in the field of medicine can help deliver more personalised healthcare, thus avoiding errors and possibly reducing the length of a patient's hospitalization. This type of person-centred healthcare delivery can enable doctors and professionals to conduct in-depth and concise research on a patient's condition since they have continuous access to their medical data and can monitor their medical state and progress more effectively. Additionally, the use of ICTs has been proven to be really effective for people suffering from chronic illness, like diabetes, heart disease, asthma or anxiety. Apart from the reduced utilization of services, ICTs enable self-management. People suffering from chronic diseases usually need tools that educate and empower them in self-care. This way, the use of ICTs can help by giving them feedback or by monitoring and evaluating their adherence to treatment.

The use of e-Health services can also be of great assistance in cases of patients living in remote areas or in less- and middle-income countries, where access to hospitals is limited. Therefore, populations that are vulnerable in regards to health status and delivery have the chance to connect with professionals through videoconferences for example and can have access to consultation and medical imagery.

E-Health practices can also have a cost-saving potential since monitoring patients at home through the use of ICTs can decrease the need for in-person clinic visits and thus reduce the costs of hospital visits and hospitalization. Furthermore, even low-cost mobile technologies can help improving healthcare delivery especially in LIMCs where quality and resources in the healthcare sector are limited. Additionally, the use of ICTs could also help reducing the high costs for research and data collection efforts since ICT platforms can be re-used and upgraded. The use of AI could also have a positive economic impact, as certain AI techniques can replace professionals and this way the costs for educating doctors can be reduced. Moreover, the use of e-Health services could also positively affect the economies of certain remote areas where accessibility to hospitals is limited. Specifically, less doctors and professionals, specialized in specific fields in medicine will be needed in places such as remote islands and faraway villages, thus reducing costs.

Challenges and obstacles

Despite the many benefits of the implementation of e-Health services, there are still some obstacles that are still holding the global community back on fully implementing an e-Health strategy. Although the use of e-Health services can turn out to be cost-effective the whole funding of its implementation is highly costly. A full and

successful integration of e-Health practices can be really time consuming and expensive, since it requires the adaptation and implementation of advance and expensive technologies, infrastructure and capacity as well as training of doctors and professionals. Therefore, many countries, especially the ones that are less economically developed, still question whether such an innovation would actually be feasible or not.

One of the most important drawbacks of e-Health is the risk of privacy and security violation. Many people are still questioning how effective and safe e-Health practices like the use of EHRs are, since these digital records obtain one's personal information including their names, e-mail and street addresses, medical records, medical history, billing procedures, laboratory test results and medical IDs. In addition, the many reported data breaches and cyber attacks that have occurred in the past have further increased concerns and fears in regards to security abuse.

Data Breaches⁹

One of the reasons why people are still questioning the use of e-Health services is the risk of privacy violation, a situation that has been seriously inflamed due to some vital data breaches that took place in the past. One of the most important ones is a data breach that hit a US health insurance company, Anthem Inc. and was called the Anthem Inc. medical data breach, which is said to have taken place in the year 2014, even though the company announced it in 2015. The breach affected around 79 million individuals' information, including patients' names, e-mail addresses, street addresses, medical records and medical IDs.

Another example of a remarkable data breach was the one the company AccuDoc Solutions Inc. suffered in 2018. The breach affected 2, 65 millions of Atrium Health patients, exposing the patients' health insurance information, account balances, addresses and social security numbers.

Lastly, in 2019, the American Medical Collection Agency (AMCA) suffered a serious data breach, exposing 24, 4 millions of patients and affecting more than 20 healthcare companies. The amount of data breaches in 2019 was estimated to be around 3,800 exposing around 4 billion of records and thus affecting billions of people all around the world. Such data breaches raise concerns about issues like identity theft and lead to people questioning the confidentiality of e-Health practices.



9 Figure 3:
<https://shsuservice>

[0031294146large.jpg](https://shsuservice)

Figure 3: Security of personal data is a challenge for e-Health implementation

e-Health and COVID-19

One of the benefits of the use of e-Health practices is that emergencies and diseases spreading across the globe can be tackled more efficiently and quickly, since the use of ICTs does not require physical contact between the patient and the doctors. This way, a perfected use of e-Health practices would possibly be of great assistance in situations of global pandemics, like the one the world has been going through the past few months, namely the Coronavirus pandemic.

So far, countries and international organizations have made progress towards tackling the issue of the Coronavirus with the aid of e-Health strategies. The European Commission has already adopted an EU toolbox on "Mobile applications to support contact tracing in the EU's fight against COVID-19" since the 16th of April 2020 supporting the use of contact tracing applications or applications that can provide the users with medically advised information based on their symptoms. Additionally, on 13 May 2020 EU Member States and the European Commission adopted interoperability guidelines for approved contact tracing mobile applications so that the users' data are safeguarded and not at risk. The European Commission has also introduced a Clinical Management Support System based on ERNs. Its main goal is to help doctors and professionals dealing with complex situations of COVID-19 infections communicate and exchange knowledge and information in order to tackle the issue and help people suffering from the virus recover more easily and effectively.

MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

United Kingdom (UK)

Each of the four countries that constitute the United Kingdom, namely England, Wales, Scotland and Northern Ireland has its own health service that operates individually, but all of them are branded as the National Health Service (NHS) and cooperate closely in order to deliver medical assistance to all UK citizens efficiently.

UK's NHS has done great steps as far as e-Health services are concerned. Specifically, the NHS promotes the use of EHRs and e-Prescription services, also known as Electronic Transmission of Prescriptions (ETP), a system through which professionals and doctors are able to send prescriptions to patients through the internet or other communication means. The NHS has also been using Summary Care Records (SCR) which are digital records for crucial patient data that have replaced a former NHS system, the National Program for Information Technology (NPfIT), which was eventually dismantled in 2011.

United States of America

The US is seriously involved in the implementation of e-Health services and many medical institutions as well as federal and state governments are promoting the use of EHRs. Additionally, the Office of the National Coordinator for Health Information Technology (ONC) which is a division of the Office of the Secretary in the US Department of Health and Human Services, has developed the "Federal Health Information Technology Strategic Plan 2011-2015". The main goals of this Plan are the promotion of the use of e-Health strategies, the improvement of the healthcare system, the reduction of healthcare costs through the use of information technologies and the inspiration of confidence and trust in such strategies. It is also important to mention that the US is a country that has suffered severely from data breaches over the years, due to the great amounts of medical data and possibly due to the legislation against personal data breaches, which is not that severe and strict.

Canada

Canada has been seriously investing in the health info-structure since the end of the 20th century and in the year 2000 the development of health information and communications technologies and the use of EHRs were identified as two of the top priorities of the Canadian government. Additionally, a crucial step towards the improvement of Canada's info-structure was the development of the Canada Health Infoway Inc. (Infoway). Infoway is an organization, whose members are Canada's 14 Deputy Ministers of Health that aims at the development of ICT and EHR strategies as well as at the introduction of certain health info-structure standardization and interoperability standards.

Organization for Economic Co-operation and Development (OECD)

The Organization for Economic Co-operation and Development has played a major role in the implementation of e-Health services worldwide, since one of the OECDs objectives is to help improve the national health systems of countries by measuring health outcomes and analysing policies for the improvement of healthcare

systems. Therefore, the OECD has been working on digital strategy, on the use of AI and on health data governance and has published the OECD Guide to Measuring ICTs in the Health Sector whose aim is to provide professionals, like analysts and statisticians with standard reference in regards to ICTs and to help nations understand both the socioeconomic benefits and the barriers regarding ICT use.

World Health Organization (WHO)

The World Health Organization is the main United Nations' organ responsible for international public health. Therefore, it has been one of the major organizations involved with the issue of the use of e-Health services worldwide and is leading the development of a global strategy on digital health. So far the WHO has done great efforts towards the implementation of e-Health practices through developing the Global Observatory for e-Health, through adopting various resolutions as well as through publishing numerous reports and strategy toolkits. The WHO has also been promoting the use of m-Health and the integration of measures and policies in order to prevent data breaches and security violations through the use of ICTs and EHRs.

European Union (EU)

The European Union has been really active in regards to the adoption of e-Health services by Member States. Specifically, the EU has acknowledged that the use of ICTs in the healthcare sector can turn out to be really efficient and can increase sustainability in national health systems and has adopted the e-Health Action Plan 2012-2020. Furthermore, the EU has established the Cross-Border Healthcare Directive, offering medical assistance to patients in any other EU Member State and the e-Health Network, a network focusing on the issues of interoperability and standardization on a European level. The EU has also been using ERNs aiming at the promotion of innovative clinical ideas towards tackling complex medical situations and conditions and has also been conducting serious research on e-Health practices through programmes like Horizon 2020.

TIMELINE OF EVENTS

DATE	DESCRIPTION OF EVENT
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23 January 1998	Recognition of the internet 's potential to positively affect health through advertising and promotion of products by the WHO.
2005 May	The 58th World Health Assembly in Geneva recognizes the potential of e-Health services to improve healthcare and encourages Member States to integrate e-Health practices in their health systems.
2005 May	The launch of the Global Observatory for e-Health by the WHO.
6 December 2012	Implementation of the e-Health Action Plan 2012-2020 by the European Commission
2012	Introduction of the National e-Health Strategy Toolkit by the WHO and the International Telecommunication Union (ITU).
2015 February	The Anthem medical data breach: Anthem Inc. (U.S. health insurance company) disclosed that around 79 million medical records, including patients' identifiable information had been stolen.
27 May 2016	Introduction of a report on m-Health and on the use of mobile wireless technologies for public health by the 139th Executive Board.
2016	Publication of the report "From Innovation to Implementation e-Health in the WHO European Region.
2017	Launch of the first Electronic Reference Networks.
2018 January	Introduction of an updated report on m-Health: "Use of appropriate digital technologies on public health" by the Executive Board.

2018 May	The World Health Assembly recognizes the potential of digital technologies in healthcare and urges Member States to prioritize the development of such.
15 March 2020	Introduction of the e-Health Network: "Mobile applications to support contact tracing in the EU's fight against COVID-19" by the European Commission.
2020	Launch of the COVID-19 Clinical Management Support System (CMSS) by the European Commission in order to support communication and discussion between doctors and professionals with the aid of ERNs.

RELEVANT UN RESOLUTIONS, TREATIES AND EVENTS

United Nations World Health Organization Resolution EB101.R3¹⁰

On 23 January 1998 the WHO proposed a resolution on "Cross-border advertising, promotion and sale of medical products through the Internet" acknowledging how beneficial the internet and other electronic communication means can be in regards to the dissemination of medical information and to the improvement of the healthcare system in general. Furthermore, the Member States were encouraged to promote the use of information practices and to collaborate on issues like the dissemination of data in difficult situations and the sale of products through the internet.

58th World Health Assembly Resolution WHA58.28¹¹

The 58th World Health Assembly that took place on 25 May 2005 in Geneva, proposed a resolution on e-Health calling on the implementation of a long-term strategic plan on e-Health practices by Member States and on the development of the infrastructure needed for ICTs.

¹⁰ *Apps.Who.Int*, 2020,
https://apps.who.int/gb/archive/pdf_files/EB101/pdfangl/angr3.pdf?ua=1.

¹¹ *Apps.Who.Int*, 2020,
https://apps.who.int/iris/bitstream/handle/10665/20378/WHA58_28-en.pdf;jsessionid=3EC24B798F4773DA311E4722E1BB7493?sequence=1.

66th World Health Assembly Resolution WHA66.24¹²

On 27 May 2013, the 66th World Health Assembly voted on a resolution on "E-Health standardization and interoperability" that recognized the need to use ICTs in order to improve health and acknowledged that the collection and use of patients' health information need to adhere to standards and measures on data protection. Additionally, it requested the promotion of a harmonization of e-Health standards in accordance with standardization agencies.

71st World Health Assembly Resolution WHA71.7¹³

The 71st World Health Assembly proposed a resolution on "Digital health" on the 26th of May 2018 requesting the development of data protection policies in order to prevent security violations when accessing and sharing medical data and the evaluation and utilization of digital technologies as well as their integration into the already existing healthcare systems.

World Summit on the Information Society Action Plan WSIS-03/GENEVA/DOC/5-E¹⁴

The first phase of the World Summit on Information Society took place in Geneva in 2003 calling on a Plan of Action whose main goal was to bring half of the world's population online by the year 2015. According to the Geneva Plan of Action, one of the Action Lines was "ICT applications: benefits in all aspects of life", focusing on e-Health among other issues. Specifically, the Plan of Action called on the adoption of ICTs in order to improve healthcare in remote and vulnerable places and communities, on the development of international security standards for the exchange of medical information and on the expansion of ICT practices in order to be able to provide medical assistance in the event of emergencies and disasters.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

12 *Apps.Who.Int*, 2020, https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R24-en.pdf?ua=1.

13 *Apps.Who.Int*, 2020, https://apps.who.int/gb/ebwha/pdf_files/WHA71/A71_R7-en.pdf?ua=1.

14 "WSIS: Plan Of Action". *Itu.Int*, 2020, <https://www.itu.int/net/wsis/docs/geneva/official/poa.html>.

Since the introduction of the idea of e-Health services major steps have been taken towards perfecting their use and thus fully implementing them. The contribution of the WHO is of great importance, since the WHO has already introduced various initiatives, has published many reports and proposed numerous resolutions on the matter so far. As it was mentioned before, the WHO has introduced the Global Observatory for e-Health, which is an initiative that can be considered as a huge step towards overcoming obstacles in the process of implementing a global e-Health strategy, since it is responsible for studying, observing as well as informing other countries in regards to the evolution of e-Health and its impact on the world. Furthermore, several measures have been implemented regarding the standardization and interoperability of e-Health strategies so that issues like data breaches can be eliminated. For instance, the European Commission has introduced the e-Health Action Plan 2012-2020, focusing on the implementation of regulations and standards towards healthcare improvement.

POSSIBLE SOLUTIONS

Many countries already have integrated e-Health strategies into their healthcare systems while others are still quite far from it. In any case there are still some barriers holding the global community back from fully implementing e-Health practices and therefore some possible solutions to the issue would be the introduction of several projects and initiatives, the implementation of end-to-end encryption systems, the execution of certain laws regarding personal medical data and the implementation of AI strategies in healthcare.

Introduction of new programmes and initiatives

Since one of the main obstacles regarding a full implementation of e-Health services is the slow dissemination of the idea and the lack of crucial information regarding the matter, a possible solution towards overcoming it would be the introduction of programmes and initiatives like the Global Observatory for e-Health aiming at conducting research and informing the world about the newest technological advancements and the best ways of implementing ICTs into the health system.

End-to-end encryption and legislation

Another major obstacle is the risk of privacy violation. A way of solving this issue would be the implementation of an end-to-end encryption system in regards to the use of EHRs for instance, in order to prevent data breaches and to secure patients' medical information more efficiently. Another way of solving the issue would be the execution of

several laws and measures so that cyber-attacks and data breaches are considered a felony and are pressed with legal charges.

Artificial Intelligence techniques

The rapid growth of Artificial Intelligence could also seriously contribute in the evolution of e-Health and could possibly be an effective solution to the problems that hold the world back from fully implementing e-Health practices. It is really important to mention that even though AI techniques are more complex than non-AI ones, they have proven to be more accurate and safe. This would be highly beneficial, since one of the main issues of e-Health services the world is dealing with nowadays is the risk of security abuse. Furthermore, AI techniques can be of great assistance in regards to managing medical records, like EHRs as well as medication management and treatment design based on a patient's record and conditions. AI applications can also help diagnosing and treating diseases since they can utilize symbolic models of illnesses and can analyse and compare them with a patient's symptoms and signs and can therefore be proven to be more effective than non-AI applications that rely only on statistics.

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